

What is claimed is:

- 1 1. A method for performing array microcrystallizations to determine
2 suitable crystallization conditions for a molecule, the method comprising:
3 forming an array of microcrystallizations, each microcrystallization
4 comprising a drop comprising a mother liquor solution whose composition
5 varies within the array and a molecule to be crystallized, the drop having a
6 volume of less than 1 microliter;
7 storing the array of microcrystallizations under conditions suitable
8 for molecule crystals to form in the drops in the array; and
9 detecting molecule crystal formation in the drops by taking images
10 of the drops.
- 1 2. The method according to claim 1 wherein taking images of the drops
2 comprises taking a single image of each drop.
- 1 3. The method according to claim 1 wherein taking images of the drops
2 is performed without having to adjust a focus of an optical system taking the
3 images.
- 1 4. The method according to claim 3 wherein taking images of the drops
2 comprises taking a single image of each drop.
- 1 5. The method according to claim 1 wherein the molecule is a
2 macromolecule.

- 1 6. The method according to claim 1 wherein the molecule is a protein.
- 1 7. The method according to claim 1 wherein the macromolecule has a
2 molecular weight of at least 500 daltons.
- 1 8. The method according to claim 1 wherein the drop has a volume of
2 less than about 750 nL.
- 1 9. The method according to claim 1 wherein the drop has a volume of
2 less than about 500 nL.
- 1 10. The method according to claim 1 wherein the drop has a volume of
2 less than about 250 nL.
- 1 11. The method according to claim 1 wherein the drop has a volume of
2 between about 1 nL - 750 nL.
- 1 12. The method according to claim 1 wherein the drop has a volume of
2 between about 1 nL - 500 nL.
- 1 13. The method according to claim 1 wherein the drop has a volume of
2 between about 1 nL - 250 nL.
- 1 14. The method according to claim 1 wherein each microcrystallization
2 further includes a volume of mother liquor solution separate from
3 the drop, the mother liquor solution contained in the volume having
4 the same

5 composition as the mother liquor solution contained in the drop, the volume
6 comprising less than about 500 mL of the mother liquor solution.

1 15. The method according to claim 1 wherein each microcrystallization
2 further includes a volume of mother liquor solution separate from the drop,
3 the mother liquor solution contained in the volume having the same
4 composition as the mother liquor solution contained in the drop, the volume
5 comprising less than about 250 mL of the mother liquor solution.

1 16. The method according to claim 1 wherein the mother liquor
2 solutions have at least 4 components which are varied within the array.

1 17. The method according to claim 1 wherein the mother liquor
2 solutions have at least 5 components which are varied within the array.

1 18. The method according to claim 1 wherein the array includes greater
2 than 96 microcrystallizations.

1 19. The method according to claim 1 wherein the array includes greater
2 than 192 microcrystallizations.

1 20. The method according to claim 1 wherein forming the array of
2 microcrystallizations includes using greater than 48 stock solutions to form
3 the mother liquor solutions used in the array.

1 21. The method according to claim 1 wherein forming the array of
2 microcrystallizations includes using greater than 96 stock solutions to form
3 the mother liquor solutions used in the array.

1 22. The method according to claim 1 wherein forming the array of
2 microcrystallizations includes using greater than 192 stock solutions to form
3 the mother liquor solutions used in the array.

1 23. The method according to claim 1 wherein forming the array of
2 microcrystallizations includes forming the drops within a volume range of
3 less than about 25 nL.

1 24. The method according to claim 1 wherein forming the array of
2 microcrystallizations includes forming the drops within a volume range of
3 less than about 20 nL.

1 25. The method according to claim 1 wherein forming the array of
2 microcrystallizations includes forming the drops within a volume range of
3 less than about 15 nL.

1 26. A method for performing array microcrystallizations to determine
2 suitable crystallization conditions for a molecule, the method comprising:
3 forming an array of microcrystallizations, each microcrystallization
4 comprising a hanging drop comprising a mother liquor solution whose
5 composition varies within the array and a molecule to be crystallized, the
6 drop having a volume of less than 1 microliter;
7 storing the array of microcrystallizations under conditions suitable

8 for molecule crystals to form in the drops in the array; and
9 detecting molecule crystal formation in the drops by taking images
10 of the drops.

1 27. The method according to claim 26 wherein taking images of the
2 drops comprises taking a single image of each drop.

1 28. The method according to claim 26 wherein taking images of the
2 drops is performed without having to adjust a focus of an optical system
3 taking the images.

1 29. The method according to claim 28 wherein taking images of the
2 drops comprises taking a single image of each drop.

1 30. A method for performing array microcrystallizations to determine
2 suitable crystallization conditions for a molecule, the method comprising:
3 forming an array of microcrystallizations, each microcrystallization
4 comprising a sitting drop comprising a mother liquor solution whose
5 composition varies within the array and a molecule to be crystallized, the
6 drop having a volume of less than 1 microliter;
7 storing the array of microcrystallizations under conditions suitable
8 for molecule crystals to form in the drops in the array; and
9 detecting molecule crystal formation in the drops by taking images
10 of the drops.

1 31. The method according to claim 30 wherein taking images of the
2 drops comprises taking a single image of each drop.

4025362.122104

1 32. The method according to claim 30 wherein taking images of the
2 drops is performed without having to adjust a focus of an optical system
3 taking the images.

1 33. The method according to claim 32 wherein taking images of the
2 drops comprises taking a single image of each drop.

1 34. A method for performing array microcrystallizations to determine
2 suitable crystallization conditions for a molecule, the method comprising:
3 forming an array of microcrystallizations, each microcrystallization
4 comprising a microcrystallization volume comprising a mother liquor
5 solution whose composition varies within the array and a molecule to be
6 crystallized, the microcrystallization volume having a volume of less than 1
7 microliter;
8 storing the array of microcrystallizations under conditions suitable
9 for molecule crystals to form in the microcrystallization volumes; and
10 detecting molecule crystal formation in the microcrystallization
11 volumes by taking images of the microcrystallization volumes.

1 35. The method according to claim 34 wherein taking images of the
2 microcrystallization volumes comprises taking a single image of each
3 microcrystallization volume.

1 36. The method according to claim 34 wherein taking images of the
2 microcrystallization volumes is performed without having to adjust a focus
3 of an optical system taking the images.

1 37. The method according to claim 36 wherein taking images of the
2 microcrystallization volumes comprises taking a single image of each
3 microcrystallization volume.

1 38. The method according to claim 37 wherein the molecule is a
2 macromolecule.

1 39. The method according to claim 37 wherein the molecule is a
2 protein.

1 40. The method according to claim 37 wherein the macromolecule has a
2 molecular weight of at least 500 daltons.

1 41. The method according to claim 37 wherein the microcrystallization
2 volume has a volume of less than about 750 nL.

1 42. The method according to claim 37 wherein the microcrystallization
2 volume has a volume of less than about 500 nL.

1 43. The method according to claim 37 wherein the microcrystallization
2 volume has a volume of less than about 250 nL.

1 44. The method according to claim 37 wherein the microcrystallization
2 volume has a volume of between about 1 nL - 750 nL.

1 45. The method according to claim 37 wherein the microcrystalization
2 volume has a volume of between about 1 nL - 500 nL.

1 46. The method according to claim 37 wherein the microcrystalization
2 volume has a volume of between about 1 nL - 250 nL.

1 47. The method according to claim 37 wherein the mother liquor
2 solutions have at least 4 components which are varied within the array.

1 48. The method according to claim 37 wherein the mother liquor
2 solutions have at least 5 components which are varied within the array.

1 49. The method according to claim 37 wherein the array includes
2 greater than 96 microcrystallizations.

1 50. The method according to claim 37 wherein the array includes
2 greater than 192 microcrystallizations.

1 51. The method according to claim 37 wherein forming the array of
2 microcrystallizations includes using greater than 48 stock solutions to form
3 the mother liquor solutions used in the array.

1 52. The method according to claim 37 wherein forming the array of
2 microcrystallizations includes using greater than 96 stock solutions to form
3 the mother liquor solutions used in the array.

1 53. The method according to claim 37 wherein forming the array of
2 microcrystallizations includes using greater than 192 stock solutions to form
3 the mother liquor solutions used in the array.

1 54. The method according to claim 37 wherein forming the array of
2 microcrystallizations includes forming the microcrystallization volumes
3 within a volume range of less than about 25 nL.

1 55. The method according to claim 37 wherein forming the array of
2 microcrystallizations includes forming the microcrystallization volumes
3 within a volume range of less than about 20 nL.

1 56. The method according to claim 37 wherein forming the array of
2 microcrystallizations includes forming the microcrystallization volumes
3 within a volume range of less than about 15 nL.